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Risk Management Plan New Technologies for Re-engineered Operations (NTRO) - GSFC Code 405

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1.0 PURPOSE

The formulation of NASA's Integrated Financial Management Program (IFMP) resulted in an IFM Program Office managed at NASA Headquarters with multiple functional module projects assigned to designated NASA Centers. This Risk Management Plan, identified here as the New Technologies for Re-engineered Operations (NTRO) Risk Management Plan (or Project Risk Management Plan), is applicable to all module projects being managed at GSFC.

The risk management approach includes continuous assessment of what could go wrong, determining what risks are important to deal with, and implementing risk mitigating strategies that are reasonable and commensurate with the probable adverse effects should a risk occur. At the core of this approach is the assignment of risk management responsibilities to the appropriate management level, where there is direct professional involvement and concern over the impact of risks and where identification, mitigation, and reporting activities become an integral component of program and project management planning, budgeting, and execution.

The purpose of this Risk Management Plan is to establish the strategy for managing risks for all IFMP module projects managed at GSFC. Roles and responsibilities for each level of Project management as well as standard processes and techniques for identifying, analyzing, planning, tracking, and controlling Project risks are documented. The plan also addresses the top risks currently identified by the Resume Management project, specifies how they are mitigated, and describes how the effectiveness of risk mitigation strategies are determined and monitored. The Risk Management Plan was developed consistent with the IFM Program Risk Management Framework and NPG 7120.5A. This plan will be continuously updated and kept current with the evolution of the IFM Program and its projects. Project-specific appendices to this Plan are used to track Project risks, mitigation plans and actions taken, and risk status.

2.0 INTRODUCTION

2.1 Principles

IFMP Risk Management is grounded in a set of principles developed as a result of assessing deterrents to effective risk management and best practices employed by software projects similar to IFMP. This Risk Management Plan follows those same principles, which are defined in the IFM Program Risk Management Framework.

2.2 Process Overview

The Risk Management process is based upon the Software Engineering Institute (SEI) Continuous Risk Management Paradigm. Risk management comprises purposeful thought as to the sources, magnitude and mitigation of project risks and results in actions directed at reducing those risks. The Risk Management Process addresses the key tenants of effective project risk:

• Risk management is a <u>continuous</u> process which occurs throughout the project's life cycle CHECK THE GSFC CENTRALIZED CONFIGURATION MANAGEMENT SYSTEM [CCMS] AT http://gdms.gsfc.nasa.gov/gdms TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE.

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• Risk management is an <u>integral</u> part of the project management decision-making at all levels

The following figure illustrates the five phases of the SEI Continuous Risk Management Model. Each risk nominally goes through these functions sequentially, but the activity occurs continuously, concurrently (e.g., risks are tracked in parallel while new risks are identified and analyzed), and iteratively (e.g., the mitigation plan for one risk may yield another risk) throughout the project life cycle.



Figure 14.1 - IFM Program Continuous Risk Management Phases

Risk Identification

The RM and PDM Projects will search for and locate programmatic risk before they impact the system implementation. The major areas of risk for the Integration Project, which are inherent to any major COTS software implementation, include schedule, cost, integration/technical, and mission.

Risk Analyses

After risks have been identified, they are classified and prioritized based on risk severity, computed as the product of (probability of occurrence) X (impact of occurrence).

Risk Planning

Identified risks are addressed by deciding upon the appropriate handling option and developing and executing commensurate mitigation strategies.

Risk Tracking

Identified risks and the progress of mitigation actions are tracked. Periodically, risk status, trend analysis, and success of mitigation efforts are reported to the appropriate Project Manager and Program Director. Feedback on both program and project risks activities, and emerging risks are continuously provided to program/project staff and communicated to key stakeholders and customers.

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Risk Control

Periodic management reporting identifies deviations from approved risk mitigation strategies, which will then be corrected.

2.3 Organization

Each Project is comprised of two components:

- Managerial Code 405 New Technologies for Re-engineered Operations (NTRO) Project Office, Lead Center
- Module Project Team

IFMP Module Projects are managed centrally by the NTRO Project Office located at NASA Goddard Space Flight Center (GSFC). Responsibilities of this office include:

- Obtaining Center commitment to support the Project
- Contracting for COTS software and implementation services
- Managing the Module Project Teams
- Monitoring and reporting project status to IFM Program and GSFC management

Responsibilities of the respective Project Teams include:

- Working with the Integration Project to integrate a new module into the IFM integration architecture and operational environment
- Coordinating with the Agency Process Team and Receiving Center representatives during implementation
- Implementing approved, NASA-specific ancillary solutions for functionality gaps in the proposed COTS
- Pilot Center development and implementation
- Leading the Agency transition
- Develops training materials and manages training at all Centers
- Facilitates Change Management for the assigned module at all Centers
- Working with operations elements and supporting transition to operations

The NTRO Project Office shares responsibility for managing Project risks with the Module Project Teams. Specific roles and responsibilities include:

Project Manager

• Identify top Project risks (nominally 5-10) for management and external status reporting

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- Assess Project risks identified by Project Teams, external reviews, and assessments
- Delegate responsibility for individual risks to members of the Project Teams
- Approve mitigation strategies and contingency plans for top Project risks
- Monthly, monitor Project risk status, contingency plans, and mitigation efforts
- Monthly, report risk status, trend analysis, and success of mitigation efforts of Project's top risks to the Program Director and HR Steering Committee
- Continuously assess risks identified by Project team members, Receiving Centers, and periodic external reviews

Module Project Team Leads (Functional, Technical, and Change Management)

The Module Project Team Leads, working with other Project team members, will be responsible for:

- Identifying new risks (utilize risk identification techniques as appropriate; Industry surveys/best practices, Benchmarking Resource Library)
- Developing and implementing handling options, mitigation strategies, and contingency plans for assigned risks
- Reporting risk status, trend analysis, success of mitigation efforts in reducing the probability and/or impact of assigned risks, monthly, and contingency planning to the Project Manager
- Performing a reassessment of risks (re-evaluate severity), monthly

Receiving Center Lead

- Manage system module Center implementation and change management risks for the Receiving Center
- Develop Receiving Center's Risk Management Plan (may be incorporated into Center Implementation Plan)
- Continuously, assess risks identified by Center Implementation Team members, and periodic external reviews and assessments
- Delegate responsibility for individual deployment and change management risks to members of the Center Implementation Team
- Identify top Implementation risks for management and external status reporting
- Approve mitigation strategies and contingency plans for top Center Implementation risks
- Continuously monitor Receiving Center risk status, trend analysis, success of mitigation efforts, and contingency plans
- Monthly, report status, trend analysis, success of mitigation efforts, and contingency plans of Receiving Center's top risks to RM and PDM Technical Team Leads
- As appropriate, report status, trend analysis, success of mitigation efforts, and contingency plans of Receiving Center's top risks to external entities

IFM Program Director

• Reviews top Project risks on a monthly basis

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2.4 Issues

It is recognized that to achieve success, the Projects need to give attention to issues as well as risks. Issues are characterized by:

- Specific in nature
- 100 % certainty of occurrence
- Defined solution often employed to address the issue or reduce impact
- Potential for negative impact to Program or Project

The Module Projects review issues on a weekly basis. Significant Project issues are captured and tracked in the GSFC Top 10 Issues database. The Project Manager reports the status of issues as a brief recount (issue statement, responsible party, potential impact, and status) of current active issues and those that were closed during the previous week. The Project Manager will delegate this responsibility and give database access to the Team Leads to perform this activity. Issues and associated actions are tracked in the Project's Issues/Action Tracking database and statused on a weekly basis. The Projects identify and report the status of top issues at the monthly GSFC Pre-Monthly Status Review (Pre-MSR), IFMP Monthly Project Status Review (IFMP MPSR), and at the Quarterly MSR to the GSFC Program Management Council (PMC).

3.0 RISK IDENTIFICATION

Risk management activities commenced during the formulation stage with the review of lessons learned, industry surveys of best practices, COTS software maturity and conformance with NASA IT standards, and experiences gained from the unsuccessful KPMG development effort. The lessons learned analysis examined the risks and issues faced by predecessor programs attempting to implement organization-wide business systems. Industry surveys identified strategies for success and causes for failure of COTS business system implementations. Using the lessons learned and industry information as drivers, each Module Project defines a set of initial risks. As the Projects progress, additional risks will be identified and addressed. Module Project risks are maintained in separate appendices documents as identified below:

These appendices provide a continuously updated management summary of all Project risks (risk statement, mitigation options, actions taken/planned, original probability, impact, and severity, current risk profile based on analysis of the effectiveness of mitigating actions). This appendix is maintained as a separate document apart from this plan and is available through the Project Manager, Project Risk Manager, or on NTRO's Virtual Office.

3.1 Staff Identification of Risks

Each member of a Project Team is encouraged to identify and report potential risks in their focus area. Each Team Lead will continuously project forward the logical outcomes of current risk strategies, plans, and activities; exercising their expert opinion and judgment to identify new risks.

Independent Assessments may be initiated during the various phases of each Module Project implementation to determine module-specific challenges, appropriateness of integration strategy and plans, effectiveness of integration efforts, and identification of potential risks.

Newly identified risks are discussed at weekly Project team meetings to determine the appropriate handling option. The Project Manager assigns responsibility for addressing each Project risk. Risks judged to be Program or Integration Project related are referred to the Program Director or Integration Project Manager as appropriate.

3.2 Risk Identification/Analysis Tools and Techniques

Top-down and bottoms-up analyses can be useful approaches for identifying and analyzing Project risks. A top-down approach involves the identification of significant management (ex., governance structure, contractor groups), functional (ex., re-engineered processes, COTS software capabilities, requirements), and operational (ex., COTS software implementation and performance, computer systems, network) components followed by a qualitative analysis of the potential points of failure and their root causes. Review of lessons learned from similar projects is a typical, or traditional, top down analytical technique. Fault Tree Analysis (FTA) is an example of a rigorous top down technique. A bottoms-up approach involves the expression of the project as a detailed set of events or activities followed by the identification and mitigation of potential causes of failure. Failure Mode, Cause, and Effect Analysis (FMCEA) is an example of a rigorous bottoms-up technique.

Projects managed by the NTRO office will evaluate risks from two perspectives: top-down assessment, from a mission success perspective; and bottoms-up assessment that concentrates on the individual contributors to risk. Risk identification/analysis tools and techniques to be used by the Projects will include:

- 1. Fault Tree Analysis
- 2. Historical data
- 3. Lessons Learned
- 4. Individual or group expert judgment
- 5. Detailed analysis of the work breakdown structure (WBS), resources and schedule.

3.3 Lessons Learned Library

The IFMP has established a Benchmarking Resource Library (BRL) to house and make available, lessons learned and best practices regarding historical IFMP, and current IFMP Projects. This library and the NASA Lessons Learned database can be important information resources to help identify potential risks and successful mitigation strategies.

The Project Manager and Team Leads discuss and agree on Project-related lessons learned that merit incorporation into the IFMP BRL. The Project Manager reviews each lesson learned prior to submission to the IFMP Change Manager for entry into the IFMP BRL. An analogous process is performed prior to sending candidate lessons learned to the NASA Lessons Learned database manager. Projects lessons learned are also posted to the IFMP web site.

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4.0 RISK ANALYSIS

Identified project risks are assessed to determine the probability of occurrence, impact to the Project if the risk does occur, and the overall severity level for each risk (probability x impact). Below are the probability and impact determinant matrices used as guidelines for these assessments.

4.1 Probability Assessment

Each risk will be assigned a high, medium, or low probability of occurrence based on the following risk probability matrix.

Low (1)	The event will probably will not happen		
	OR		
	Historical evidence, including lessons learned, suggests this to be an unlikely occurrence		
	OR		
	Has not happened in other organizations of similar size		
Medium (2)	The event has a reasonable likelihood of occurrence		
	• OR		
	 Historical evidence, including lessons learned, suggests this sometimes occurs 		
	This event is very likely to occur		
High (3)	OR		
	Historical evidence, including lessons learned, suggests this to be a very likely occurrence		
	OR		
	Has happened in other organizations of similar size		

4.2 Risk Categories

Risks for COTS information system projects manifest themselves in the form of cost overruns, schedule slippage, integration/technical (technical non-performance), and failure to achieve mission (programmatic) results. The IFM Program has determined that identified risks should be associated with one or more of the four risk categories:

Cost

Budget and staffing

Schedule

• Formulation, implementation, and deployment schedules

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Integration/Technical

- System module deployment
- Integration complexities
- IT infrastructure
- Performance
- Supportability

Mission success

- Agency business drivers and Project functional drivers
- Functional requirements
- Gap in system functionality vs. requirements
- Successful reengineered process implementation

4.3 Assessment of Impact

The matrices that follow are used to assess the impact of each risk according to the identified risk category. When a risk is associated with more than one category, the risk's impact in each associated category is assessed and the highest impact level is used to compute risk severity.

Risk Impact Criteria: Cost

Low (1)	 Impact limited to task or activity OR Project budget overruns can be fully covered by partial use of Project funding
Medium (2)	 reserves Project budget overruns can be fully covered by full use of available Project funding reserves
High (3)	Project budget overruns or other negative budget events impact Program funding available for pending modules; causing a delay in initiating new modules and/or eliminating planned modules

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Risk Impact Criteria: Integration/Technical

- 725			
Low (1)	Noticeable, but acceptable system performance degradation during peak periods OR		
	Software does not support some in-place desktop equipment but upgrades are scheduled/expected OR		
	Though some functionality is lost, system module viability does not depend on availability of interfaces		
Medium (2)	 Unacceptable system performance degradation during peak load periods OR 		
	 Software does not support some in-place desktop equipment and no upgrades are scheduled 		
	OR		
	Significant modular functionality dependent on availability of interfaces		
High (3)	 System performance is unsatisfactory during periods of normal operations OR 		
	 System solutions incompatible with NASA's IT standards OR 		
	 Overall system viability depends on availability and integrity of interfaces OR 		
	• Inability to satisfactorily integrate modules results in the IFM system becoming a collection of stovepipe systems		

Risk Impact Criteria: Schedule

Low (1)	 Individual task completed late but Project control dates still can be met OR Performance related issues or decision making delays cause control dates and /or Project end date to be missed but Program/external dependencies are few or non- 	
	existent	
Medium (2)	 Project control date(s) missed, but Project end date is not slipped OR 	
	 Performance related issues or decision making delays cause control date(s) and/or Project end date to be missed but there is no critical impact on Program/external dependencies 	
High (3)	 Performance related issues or decision making delays cause project end date to be missed with significant impact to Program/external dependencies OR 	
	 Loss of Executive management commitment causes significant impact to IFMP schedule strategy 	

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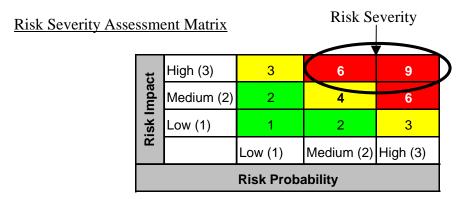
Risk Impact Criteria: Mission Success

Low (1)	Miner for the called in last due to a consistence of for at a called		
Low (1)	 Minor functionality is lost due to requirements/functionality gap OR 		
	 Functionality loss is acceptable; No gap closure is necessary OR 		
	Minor staff resistance encountered; no additional transition support required OR		
	 Unable to deploy new software on a small number of workstations; could be addressed by workstation sharing or dedicated workstations 		
	OR		
	Limited amount of functional driver benefit not met by module		
Medium (2)	• Significant level of functionality is lost due to requirements/functionality gap OR		
	 Unmet functionality can be accommodated by process changes OR 		
	Workarounds exist to offset loss of functionality OR		
	• Significant, additional transition support required to overcome staff resistance OR		
	 Additional software bolt-ons required to facilitate deployment OR 		
	Module achievement is substantially below expectations for one functional driver		
High (3)	Major functionality is lost in requirements/functionality gap OR		
	Additional software is needed to close gap and make system module viable OR		
	No workarounds exist to alleviate major functionality loss OR		
	New system is rejected by users OR		
	Changes to COTS software required to facilitate deployment of new software in IFMP IT environment		
	 OR Module fails to achieve one or more functional drivers or is substantially below expectations for multiple functional drivers 		

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4.4 Risk Severity Determination

Using the Probability and Risk Impact matrices, each risk is assigned a probability and impact rating in each of the four risk categories. Using these ratings, a Risk Severity Assessment matrix is generated for each risk, for each category. Using the numeric values associated with Low, Medium, and High, the severity is determined by multiplying the probability number by the impact number. The highest level of severity identified for a risk across the four categories determines that risk's severity. The IFM Program has determined that for purposes of calculating risks, probability and impact will be weighted equally. The risk handling rules below, have been established for evaluating all risks within the IFM Program, and will be applied to each risk based on the highest severity identified across the four categories.



	Risk Probabilit y	Risk Impact	Risk Severity
Low	1	1	1,2
Medium	2	2	3, 4
High	3	3	6, 9

5.0 RISK RESPONSE, MANAGEMENT, TRACKING & CONTROL

The following paragraphs describe the planning, tracking, and control processes applicable to Project Level risks.

5.1 Risk Response Rules

The following risk handling rules have been established for the associated risk severity calculations.

• All HIGH (6, 9) severity risks require both a mitigation plan and a contingency plan

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• MEDIUM (3, 4) severity risks require a contingency plan. Mitigation strategies may be required The Project Manager may recommend that a mitigation plan be written, and may recommend a mitigation approach

• LOW (1, 2) severity risks typically don't require a mitigation strategy, or contingency plan

5.2 Risk Response Options

The standard IFMP Program Risk Handling Options are:

Transfer - Reallocate the risk to others

Accept - Do not develop mitigation strategies; prepare written rationale, identify contingency strategy if needed

Watch - Monitor risk attributes; establish metrics

Mitigate - Eliminate or reduce likelihood of occurrence or impact; identify contingency plan

The risk handling rules developed in conjunction with the risk severity determination are to be followed where applicable. Where a handling option is not specifically determined by risk severity, the risk owner will assign a handling option. The Project Manager approves assigned handling options.

5.3 Risk Timeframes

There are two timeframes that can be associated with the management of risks. The first timeframe is when the impact of a risk is likely to occur, the impact timeframe. The second is the timeframe when action should be taken to mitigate the risk, the mitigation timeframe. These timeframes are often, but not always, the same. The following is a table of timeframe definitions to be applied to the planning, tracking and control activities:

- Near-term less than 90 days
- Mid-term 90-180 days
- Far-term more than 180 days.

5.4 Risk Management

The Project Manager assigns each approved risk to the appropriate staff member or organizational entity. Each person or organization that is assigned a risk becomes a risk owner, responsible for managing the assigned risk. For each assigned risk, the risk owner is responsible for:

Developing a mitigation strategy as appropriate

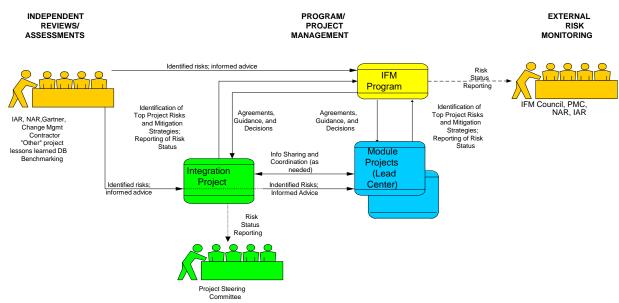
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- Developing a contingency plan as appropriate
- Obtaining Project Manager approval of mitigation strategies and contingency plans
- Implementing approved mitigation strategies
- Establish effectiveness measures
- Incorporate risk mitigation activities and milestones in the Project schedule
- Record mitigation actions taken
- Periodically evaluate effectiveness of mitigation strategies and alter ineffective strategies
- Identify and carry out continuous monitoring steps
- Monthly, report status, trend analysis, success of mitigation efforts, and contingency planning of assigned risks to the Project Manager

5.5 Risk Tracking & Control

Risks will be monitored by the risk owner to determine the effectiveness of mitigation strategies. Over time, the determined severity for a mitigated risk should decline, or at worst, remain the same. Should the mitigation strategies prove ineffective in reducing risk severity, additional or alternate mitigation strategies may be introduced. Activities associated with mitigation strategies will be incorporated into the Project schedule or the responsible Team Lead's Activity Plan. Periodic management reporting against this schedule will alert the Project Manager of deviations from the mitigation strategy. Should a risk materialize into a problem, the Project Manager may invoke the Contingency Plan, where one exists.

The Project Office has adopted the risk communications and reporting process recommended by the Program Risk Management Framework. The diagram below illustrates the communications process.



IFMP Risk Communication Process

Project level risks are identified, analyzed, tracked and reported by the Project Manager and staff. Independent reviews and assessments will provide an objective, external source of potential program risks and recommended mitigation activities. Both the Integration Project and Module Projects will receive guidance from the Program Director on the steps to be taken to mitigate Program level risks, as well as have the opportunity to identify additional potential Program level risks.

The Program Director has responsibility for ensuring that all approved module Projects have appropriately accounted for Program level risk mitigation strategies in their Project Management Plans. The Integration Project Manager will identify Integration Project risks, develop a Project Level Risk Management Plan to address those risks incorporate mitigation activities in the Integration Project schedule, and report status and progress to the Program Director. The Project Manager will ensure that the Module Project addresses the risks impacting the Project, incorporates mitigation activities in the Project schedules, and reports status and progress to the IFM Program Office and Integration Project Office.

The Project Manager identifies and determines the top risks, which will receive expanded management scrutiny. As part of periodic status reporting, the Project Manager will communicate the status of risk management activities to the Program Director, and Project Steering Committees as appropriate.

5.6 Risk Management Process

The Project Manager will appoint a Risk Manager to facilitate the Risk Management Process. The Risk Manager may be a NASA employee or a contractor; one person or a team. The Risk Manager position is not an official entity within the Project organization. Rather it is a part time role that could be assumed by any member of the Project Team or contractor support staff. The primary objectives of the Risk Manager are to get the process moving and keep it flowing.

Risk Management is an important aspect of Program and Project management, but it is tangential to the primary focus of each. As such, it benefits from a Risk Manager (facilitator) that establishes a risk management process and acts as a catalyst for that process. The Projects' Risk Management Process is approved by the Project Manager and can be updated periodically as part of process improvement.

The Risk Management Process depicted on the next page highlights decision points and facilitation activities. Activities include identifying and proposing new risks, developing risk statements, handling responses and mitigation options, calculating risk severity, and assigning risks. The Process incorporates the implementation of mitigation options, risk monitoring, reviews and assessment, and risk reporting. The process supports the risk management approach of providing continuous assessment of what could go wrong and implementing appropriate mitigation activities, and contingencies should a risk occur, as well as the assignment of risks to owners who will be responsible for their effective mitigation.

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The Project's risk management decision responsibilities may include:

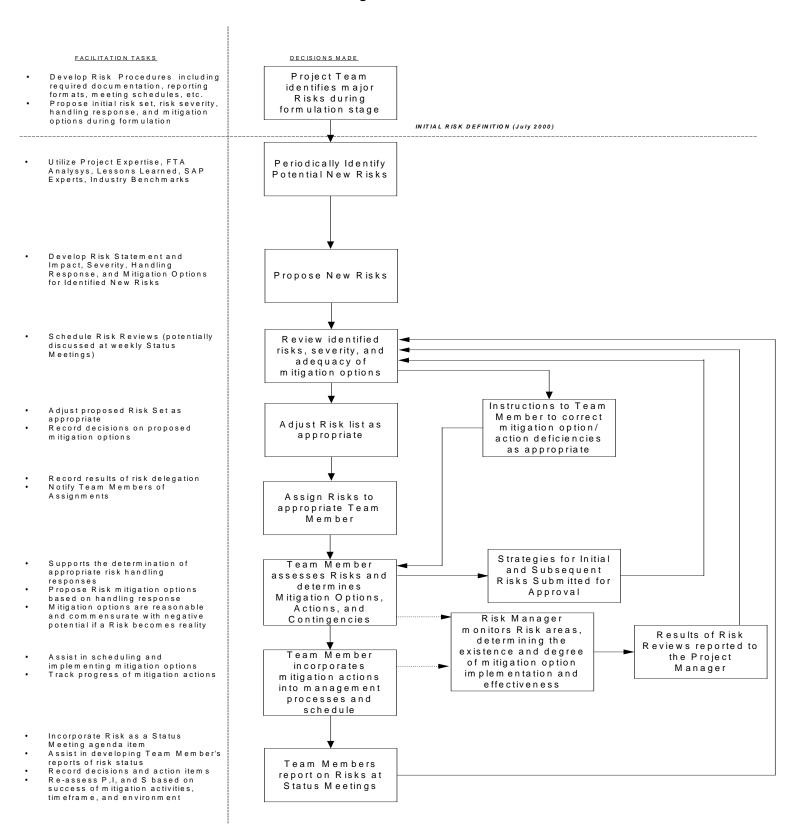
- Identifying potential new risks
- Reviewing and approving proposed new risks, severity, and adequacy of mitigation options and making adjustments
- Assigning risks to Team Members
- Assessing risks, determining mitigation options, actions, and contingencies
- Incorporating mitigation actions into management processes and schedule
- Reporting on risks at status meetings

The Risk Manager's responsibilities may include:

- Establishing and facilitating the risk management process Identifying new risks
- Assisting with risk analysis and the development of mitigation strategies
- Assisting with the scheduling and implementation of mitigation strategies
- Monitoring risks and assessing the effectiveness of mitigation actions
- Assisting in developing risk status reports
- Scheduling risk meetings, setting the agenda, presenting risk status, recording decisions made and actions assigned
- Facilitate the sharing of identified risks and successful mitigation options between Projects
- Recording risk delegation, decisions on proposed mitigation options, and mitigation action assessments

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Risk Management Process



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6.0 RISK DATABASE

The NTRO Project Office will utilize a risk data repository established on the Project's Virtual Office.

7.0 RISK MANAGEMENT COMMITMENT AND EFFECTIVENESS

This Risk Management Plan represents the Project's commitment to the identification, analysis, tracking and mitigation of program risks. The Project Manager will report risk mitigation status as part of the periodic status reporting process. The Project Manager has identified the top project risks recognized during Project formulation. The Project Manager and external advisors and oversight bodies will continuously assess effectiveness of risk management. These resources will also assess the execution of contingency plans when necessary.

Performance measures associated with the Project's risk management processes are:

- Reduce High severity risks to medium or low prior to Pilot cutover
- Reduce Medium severity risks to Low or contain the risks at Medium severity throughout implementation
- Reduce Low severity risks to zero or contain the risk at Low severity throughout implementation

The Project will collect various risk management metrics to gauge effectiveness. These include:

- Number and/or percentage of (High, Medium, Low) severity risks reduced
- Number and/or percentage of (High, Medium, Low) severity risks expired
- Number and/or percentage (High, Medium, Low) severity projected to expire prior to the end of the Project
- Number of new (High, Medium, Low) risks identified

Risks whose severity has not been reduced will be re-evaluated to determine:

- Accuracy of the Probability and Impact evaluations
- Risk controllability; can the severity be reduced as opposed to being contained
- Adequacy of identified mitigation strategies
- Level of mitigation follow-through as exhibited by actions taken

Adjustments are made to risk mitigation strategies based on this analysis.

7.1 Review Meetings

IFMP Monthly Project Status Review Meeting

 For each NTRO Project, a summary of the mitigation options and actions taken/planned for the month and a current assessment of the risk posture for each high severity risk is presented to the IFMP Management Team

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IFMP Quarterly Risk Status Review Meeting

• Quarterly, a summary discussion of all Project related risks is presented to the IFMP Management Team

Project Status Meetings

- The Project Manager will conduct weekly Status Meetings
- Current risk management activities and issues will be reviewed in the Project Status Meetings